series cannot be the same when $n \neq m$, there is some rational number between them.

Let $\sqrt{n}=e+f$, where f is the decimal part, and $\sqrt{m}=g+h$, where h is the decimal part. Then $r=e+k$, where k is any number from 1 to $g-e-1$.

171. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, England.

If $\underset{x=a}{\text{Lim.}} \frac{\phi(x)}{\psi(x)}=\lambda$, show $\underset{x=a}{\text{Lim.}} \left[\frac{\lambda}{\phi(x)}-\frac{1}{\psi(x)}\right]=\frac{\lambda\psi''(a)-\phi''(a)}{2\phi'(a)\psi'(a)}$.

Solution by G. W. GREENWOOD, M. A., Dunbar, Pa.

By hypothesis, $\phi(a)=0$, and $\psi(a)=0$. We must *assume* that $\phi'(a) \neq 0$ and $\psi'(a) \neq 0$. Then

$$\text{Lim.} \frac{\phi(x)}{\psi(x)}=\left[\frac{\phi'(x)}{\psi'(x)}\right]_{x=a}=\lambda. \quad \therefore \lambda\psi'(a)-\phi'(a)=0.$$

$$\text{Lim.}\left[\frac{\lambda}{\phi(x)}-\frac{1}{\psi(x)}\right]=\text{Lim.}\left[\frac{\lambda\psi(x)-\phi(x)}{\phi(x)\psi(x)}\right]=\text{Lim.}\left[\frac{\lambda\psi'(x)-\phi'(x)}{\phi(x)\psi'(x)+\phi'(x)\psi(x)}\right]$$

$$=\text{Lim.}\left[\frac{\lambda\psi''(x)-\phi''(x)}{\phi(x)\psi''(x)+2\phi'(x)\psi'(x)+\phi''(x)\psi(x)}\right]=\frac{\lambda\psi''(a)-\phi''(a)}{2\phi'(a)\psi'(a)}.$$

Also solved similarly by G. B. M. Zerr. Unless one assumes that $\phi(a)=\psi(a)=0$, the problem is not true, as may be easily verified. ED. F.

PROBLEMS FOR SOLUTION.

ALGEBRA.

297. Proposed by W. J. GREENSTREET, Marling School, Stroud, England.

If a, b, c, d, f, g, h are all real, and a, $ab-h^2$, $abc+2fgh-af^2-bg^2-ch^2$ are all positive, show that b, c, $bc-f^2$, and $ca-g^2$ are also positive.

GEOMETRY.

330. Proposed by J. J. QUINN, Ph. D., New Castle, Pa.

A line pivoted at the origin revolving with a constant angular velocity, intersects another moving parallel to the Y-axis with a constant linear velocity. (1) Find the locus of their intersection when the ratio of their velocities is as $m:n$ referred to a quadrant and a radius, respectively. (2) Assume $m=3$ and $n=2$, and apply to the trisection of an angle. (3) Under what conditions will this curve become a quadratrix? (4) Name the curve.